

Special Report

CEOP Satellite Data Integration



Figure 1. 500Tera-byte data archive system at the Institute Industrial Sciences, University of Tokyo

To provide satellite data integration products including 4DDA “value-added” Global Land Data Assimilation System (GLDAS) datasets, of water cycle variables, two CEOP Satellite Data Integration Centers (CSDICs) are to be established, one at the University of Tokyo (UT) in cooperation with NASDA and the other at NASA's Goddard Space Flight Center (GSFC).

The CSDIC at UT will receive CEOP customized levels 1b and 2 and standard level 3 earth observation satellite data from space agencies and archive them by using a 500 tera-byte data archival system at the Institute of Industrial Sciences of UT as shown in Figure 1. The Committee on Earth Observation Satellite (CEOS) Working Group on Information Systems and Services (WGISS) Test Facility for CEOP (CEOP-WTF) advanced by NASDA and NASA will be developed for providing catalogue interoperability with CEOS agencies' systems by using CEOS' protocols and exchanging data and information with CEOS agencies and affiliates as well as users through automated links. Integrated CEOP satellite products overlaid with in-situ data and model output will be delivered to users by Web Mapping Technology and other visual technologies through networks. UT and NASDA propose a three phased approach for production and archiving of satellite data products; Phase I, for all reference sites, started in June, 2002, Phase II, for the monsoonal regions, begin in June, 2003, and Phase III, fully operational, beginning in September, 2005. To support phenomena detection, knowledge discovery and coincident search capabilities across a huge amount of very heterogeneous datasets, “Visual Data Mining” combined with the artificial intelligence approach in the computer sciences is now being developed as an important function of the CSDIC at UT.

Scientists at GSFC have developed a high-resolution GLDAS in cooperation with researchers at NOAA's National Centers for

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Environmental Prediction (NCEP). The goal of GLDAS is to produce optimal output fields of land surface states and fluxes by making use of data from advanced observing systems (see GEWEX News May 2002 and <http://ldas.gsfc.nasa.gov/> for further details). GLDAS uses various new satellite and ground based observation systems within a land data assimilation framework to produce optimal output fields of land surface states and fluxes. GLDAS includes four components implemented globally at 1/4 degree resolution (higher resolutions are planned) in near real time: land modeling, land surface observation, land surface data assimilation and calibration and validation. The core advantage of GLDAS is its use of satellite-derived observations (including precipitation, solar radiation, snow cover, surface temperature, and soil moisture) to realistically constrain the system dynamics. This allows it to avoid the biases that exist in near-surface atmosphere fields produced by atmospheric forecast models, minimize the impact of simplified land parameterizations, and to identify and mitigate errors satellite observations used in data assimilation procedures (Figure 2 shows the GLDAS system). These value-added GLDAS data will improve land surface, weather, and climate predictions by providing global fields of land surface energy and moisture stores for initialization. GLDAS is a valuable tool for CEOP because it assimilates the information from multiple models and observation platforms to provide the best available assessment of the current state of the land surface. In addition, an interface to access data from the near-real time GLDAS operational model runs is provided through the web site (<http://ldas.gsfc.nasa.gov/map/webout.html>). A region can be specified by either manually entering the coordinates in the text boxes or automatically by creating a rectangle on the map. Users can subset the data by time period as well as parameter type. The international GEWEX and CEOP communities have recognized that GLDAS can be leveraged and further developed to address the needs of CEOP. The CSDIC at NASA GSFC is working with the CEOP-GLDAS products in cooperation with NASA Data Assimilation Office (DAO).

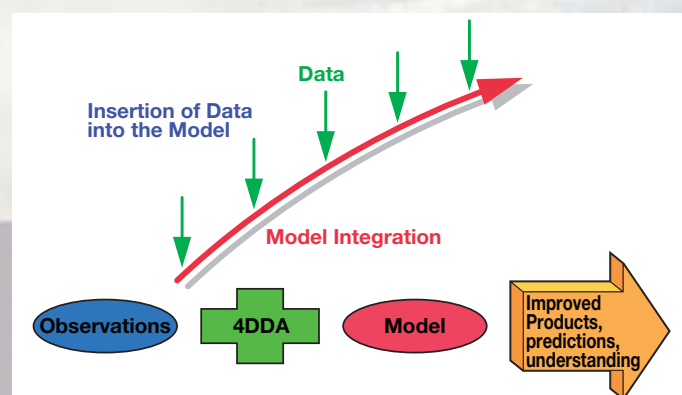


Figure 2. Concept of the Land Data Assimilation System